CLAIMS

What is claimed is:

1. A method of optimizing a route plan having a plurality of routes within a service territory, comprising:

dividing said service territory into a plurality of unassigned cells;

identifying from among a staff of drivers a most frequent driver for each of said plurality of unassigned cells based upon an average cell visit frequency to each of said plurality of unassigned cells by each of said drivers during a reference period,

wherein said average cell visit frequency represents a comparison between a number of visits to each of said unassigned cells during said reference period and a number of total visits to any of said plurality of unassigned cells during said reference period;

establishing a minimum average cell visit frequency; and

classifying each of said unassigned cells as a core cell and assigning each said core cell to a corresponding one of said most frequent drivers, if said corresponding average cell visit frequency is greater than said minimum average cell visit frequency.

2. The method of claim 1, further comprising:

storing computer-executable instructions for performing said steps on a computer-readable medium; and

executing said instructions.

3. The method of claim 1, further comprising:

dividing said service territory into a plurality of grid segments;

identifying from among a staff of drivers a most frequent driver for each of said plurality of grid segments based upon an average grid segment visit frequency to each of said plurality of grid segments by each of said drivers during a reference period,

wherein said average grid segment visit frequency represents a comparison between a number of visits to each of said grid segments during said reference period and a number of total visits to any of said plurality of grid segments during said reference period;

establishing a minimum average grid segment visit frequency; and

wherein said step of classifying each of said unassigned cells as a core cell further comprises assigning each said core cell to a corresponding one of said most frequent drivers, if said corresponding average grid segment visit frequency is greater than said minimum average grid segment visit frequency.

4. The method of claim 1, wherein said territory further comprises a hub, and wherein said step of dividing said service territory further comprises:

classifying one or more of said unassigned cells as a flex zone cell, based upon a proximity factor relating each of said unassigned cells to said hub, wherein said proximity factor comprises at least a distance element.

5. The method of claim 4, wherein said proximity factor further comprises a time element.

6. The method of claim 1, further comprising:

classifying each remaining unassigned cell as a daily cell;

selecting a nearby route from said plurality of routes based upon a proximity factor relating each of said plurality of routes to said daily cell, wherein said proximity factor comprises at least a distance element and a time element; and

assigning said daily cell to said nearby route.

7. The method of claim 1, wherein said step of identifying further comprises:

maintaining a record of one or more actual daily routes driven by a corresponding number of drivers during a reference period, said record including for each day in said reference period a route identifier, a driver identifier, a number of total stops, and a cell stop counter;

calculating a daily cell visit frequency for each of said drivers, for each of said one or more actual daily routes, by comparing said cell stop counter to said number of total stops; and

calculating an average cell visit frequency for said reference period, for each of said drivers, for each of said one or more actual daily routes, by averaging said daily cell visit frequencies over said reference period.

8. The method of claim 7, further comprising:

storing computer-executable instructions for performing said steps on a computer-readable medium; and

executing said instructions.

9. A method of optimizing a route plan within a service territory, said route plan comprising a plurality of unassigned routes, said method comprising:

(a) selecting a new route for optimization from said plurality of unassigned routes;

(b) selecting a reference day on which a route was driven by a driver;

(c) defining a convex hull polygon about said route;

(d) defining a plurality of unassigned convex hull polygons about each of said plurality of unassigned routes;

(e) comparing said convex hull polygon to each of said plurality of unassigned convex hull polygons and calculating a corresponding plurality of hull overlap areas;

(f) identifying a maximum hull overlap area from among said plurality of hull overlap areas, said maximum hull overlap area corresponding to a maximum route from among said plurality of unassigned routes;

(g) defining said new route to include said maximum route;

(h) classifying said new route as an assigned route; and

(i) repeating steps (a) through (i) a number of times equal to the number of members of said plurality of unassigned routes.

10. The method of claim 9, further comprising:

storing computer-executable instructions for performing said steps on a computer-readable medium; and

executing said instructions.

11. A method of maximizing driver visit frequency to one or more customers located at one or more respective stops within a service territory, said new driver being part of a pool of unassigned drivers, said method comprising:

(a) selecting a new driver from said pool of unassigned drivers;

(b) identifying a plurality of cells, each cell comprising a group of said one or more stops located within an area suitable for service by said new driver during a finite workday;

(c) classifying one or more of said plurality of cells as core cells if a known service volume for each of said core cells exceeds a minimum;

(d) establishing one or more core areas, each comprising a localized cluster of said one or more core cells;

(e) selecting a new core area from said one or more core areas based upon a known driver visit frequency by said new driver to each of said one or more core areas; and

(f) assigning said new driver to service said new core area;

(g) classifying said new driver as an assigned driver; and

(h) repeating steps (a) through (g) a number of times equal to the number of members of said pool of unassigned drivers.

12. The method of claim 11, further comprising:

storing computer-executable instructions for performing said steps on a computer-readable medium; and

executing said instructions.

13. The method of claim 11, further comprising:

classifying any cell located outside any of said new core areas as a daily cell;

selecting a nearest assigned driver based upon a proximity factor relating each of said new core areas to said daily cell, wherein said proximity factor comprises at least a distance element; and

assigning said daily cell to said nearest assigned driver.

14. The method of claim 13, wherein said proximity factor further comprises a time element.

15. The method of claim 14, further comprising:

classifying any stop located outside any of said new core areas or outside any of said daily cells as a daily stop;

selecting a nearest assigned stop driver based upon a stop proximity factor relating each of said new core areas to said daily stop, wherein said stop proximity factor comprises at least a distance element; and

assigning said daily stop to said nearest assigned stop driver.

16. The method of claim 15, wherein said stop proximity factor further comprises a time element.

17. A method of approximating the workload within a cell along a route, said route comprising a total distance and a number of stops within said cell, said method comprising:

estimating a mean time duration for each of said stops;

estimating an average velocity along said route;

solving a convex hull heuristic algorithm to quantify said total distance and to identify a longest arc distance between any two of said stops;

calculating a stop time factor defined by said number of stops multiplied by said mean time duration;

calculating a travel time factor defined by a quantity divided by said average velocity, said quantity defined by said total distance minus said longest arc distance; and

adding said stop time factor and said travel time factor to obtain an approximate workload.

18. The method of claim 17, further comprising:

storing computer-executable instructions for performing said steps on a computer-readable medium; and

executing said instructions.

19. A method of formulating a new algorithm to solve a stochastic vehicle routing problem in a service territory, said method comprising:

adapting a classical vehicle routing problem algorithm using a set of constraints related to said stochastic problem to form said new algorithm, said set of constraints comprising a cost constraint, a core constraint, and a driver learning constraint.

20. The method of claim 19, further comprising a method of formulating said cost constraint, said method comprising:

identifying a plurality of cells in said service territory, each cell comprising a group of one or more localized stops; and

formulating an insertion cost expression to calculate a cost of inserting each of said localized stops into a route, for each of said plurality of cells, said cost expression producing a solution to serve as said cost constraint.

21. The method of claim 19, further comprising a method of formulating said core constraint, said method comprising:

classifying one or more of said plurality of cells as core cells if a known service volume for each of said core cells exceeds a minimum;

constructing a partial route between and among said core cells; and

using said partial route as a starting point for said new algorithm, said starting point representing a solution to serve as said core constraint.

22. The method of claim 19, further comprising a method of formulating said driver learning constraint, said method comprising:

building a driver performance matrix including historical route driver data;

applying said driver performance matrix as a multiplier to augment a total time factor and a cellular time factor, said time factors being part of a driver learning curve function; and

finding a solution of said driver learning curve function, said solution to serve as said driver learning constraint.

23. A system for optimizing a route plan a route plan having a plurality of routes within a service territory, said system comprising:

a central processing unit;

a memory coupled to said central processing unit; and

a display screen coupled to said central processing unit, said central processing unit being configured for:

dividing said service territory into a plurality of unassigned cells;

identifying from among a staff of drivers a most frequent driver for each of said plurality of unassigned cells based upon an average cell visit frequency to each of said plurality of unassigned cells by each of said drivers during a reference period,

wherein said average cell visit frequency represents a comparison between a number of visits to each of said unassigned cells during said reference period and a number of total visits to any of said plurality of unassigned cells during said reference period;

establishing a minimum average cell visit frequency; and

classifying each of said unassigned cells as a core cell and assigning each said core cell to a corresponding one of said most frequent drivers, if said corresponding average cell visit frequency is greater than said minimum average cell visit frequency.

24. The system of claim 23, wherein said territory further comprises a hub, and wherein said central processing unit, in said step of dividing said service territory, is further configured for:

classifying one or more of said unassigned cells as a flex zone cell, based upon a proximity factor relating each of said unassigned cells to said hub, wherein said proximity factor comprises at least a distance element.

25. The system of claim 23, wherein said central processing unit is further configured for:

classifying each remaining unassigned cell as a daily cell;

selecting a nearby route from said plurality of routes based upon a proximity factor relating each of said plurality of routes to said daily cell, wherein said proximity factor comprises at least a distance element and a time element; and

assigning said daily cell to said nearby route.

26. The system of claim 23, wherein said territory further comprises a hub, and wherein said central processing unit, in said step of identifying, is further configured for:

maintaining a record of one or more actual daily routes driven by a corresponding number of drivers during a reference period, said record including for each day in said reference period a route identifier, a driver identifier, a number of total stops, and a cell stop counter;

calculating a daily cell visit frequency for each of said drivers, for each of said one or more actual daily routes, by comparing said cell stop counter to said number of total stops; and

calculating an average cell visit frequency for said reference period, for each of said drivers, for each of said one or more actual daily routes, by averaging said daily cell visit frequencies over said reference period.

27. A system for maximizing driver visit frequency to one or more customers located at one or more respective stops within a service territory, said new driver being part of a pool of unassigned drivers, said system comprising:

a central processing unit;

a memory coupled to said central processing unit; and

a display screen coupled to said central processing unit, said central processing unit being configured for:

(a) selecting a new driver from said pool of unassigned drivers;

(b) identifying a plurality of cells, each cell comprising a group of said one or more stops located within an area suitable for service by said new driver during a finite workday;

(c) classifying one or more of said plurality of cells as core cells if a known service volume for each of said core cells exceeds a minimum;

(d) establishing one or more core areas, each comprising a localized cluster of said one or more core cells;

(e) selecting a new core area from said one or more core areas based upon a known driver visit frequency by said new driver to each of said one or more core areas; and

(f) assigning said new driver to service said new core area;

(g) classifying said new driver as an assigned driver; and

(h) repeating steps (a) through (g) a number of times equal to the number of members of said pool of unassigned drivers.

28. The system of claim 27, wherein said central processing unit is further configured for:

classifying any cell located outside any of said new core areas as a daily cell;

selecting a nearest assigned driver based upon a proximity factor relating each of said new core areas to said daily cell, wherein said proximity factor comprises at least a distance element; and

assigning said daily cell to said nearest assigned driver.

29. The system of claim 27, wherein said central processing unit is further configured for:

classifying any stop located outside any of said new core areas or outside any of said daily cells as a daily stop;

selecting a nearest assigned stop driver based upon a stop proximity factor relating each of said new core areas to said daily stop, wherein said stop proximity factor comprises at least a distance element; and

assigning said daily stop to said nearest assigned stop driver.

30. A system for optimizing a route plan within a service territory, said route plan comprising a plurality of unassigned routes, said system comprising:

a central processing unit;

a memory coupled to said central processing unit; and

a display screen coupled to said central processing unit, said central processing unit being configured for:

(a) selecting a new route for optimization from said plurality of unassigned routes;

(b) selecting a reference day on which a route was driven by a driver;

(c) defining a convex hull polygon about said route;

(d) defining a plurality of unassigned convex hull polygons about each of said plurality of unassigned routes;

(e) comparing said convex hull polygon to each of said plurality of unassigned convex hull polygons and calculating a corresponding plurality of hull overlap areas;

(f) identifying a maximum hull overlap area from among said plurality of hull overlap areas, said maximum hull overlap area corresponding to a maximum route from among said plurality of unassigned routes;

(g) defining said new route to include said maximum route;

(h) classifying said new route as an assigned route; and

(i) repeating steps (a) through (i) a number of times equal to the number of members of said plurality of unassigned routes.

31. A method of optimizing a route plan having a plurality of routes within a service territory, comprising:

dividing said service territory into a plurality of grid segments;

identifying from among a staff of drivers a most frequent driver for each of said plurality of grid segments based upon an average grid segment visit frequency to each of said plurality of grid segments by each of said drivers during a reference period,

wherein said average grid segment visit frequency represents a comparison between a number of visits to each of said grid segments during said reference period and a number of total visits to any of said plurality of grid segments during said reference period;

establishing a minimum average grid segment visit frequency; and

classifying each of said grid segments as a core cell and assigning each said core cell to a corresponding one of said most frequent drivers, if said corresponding average grid segment visit frequency is greater than said minimum average grid segment visit frequency.

32. The method of claim 31, wherein said step of identifying further comprises:

maintaining a record of one or more actual daily routes driven by a corresponding number of drivers during a reference period, said record including for each day in said reference period a route identifier, a driver identifier, a number of total stops, and a grid stop counter;

calculating a daily grid segment visit frequency for each of said drivers, for each of said one or more actual daily routes, by comparing said grid stop counter to said number of total stops; and

calculating an average grid segment visit frequency for said reference period, for each of said drivers, for each of said one or more actual daily routes, by averaging said daily grid segment visit frequencies over said reference period.